No parent should have to think twice about the juice they pour their children at breakfast, or a hamburger ordered during dinner out.
President Bill Clinton, radio address, 25 January 1997

Garlic Fights More than Vampires

Will a clove a day keep the doctor away? That's what John A. Milner, head of the department of nutrition at The Pennsylvania State University College of Health and Human Development, believes. Milner has led a number of studies that indicate that eating garlic (*Allium sativum*, a member of the lily family) may help reduce the incidence of breast cancer.

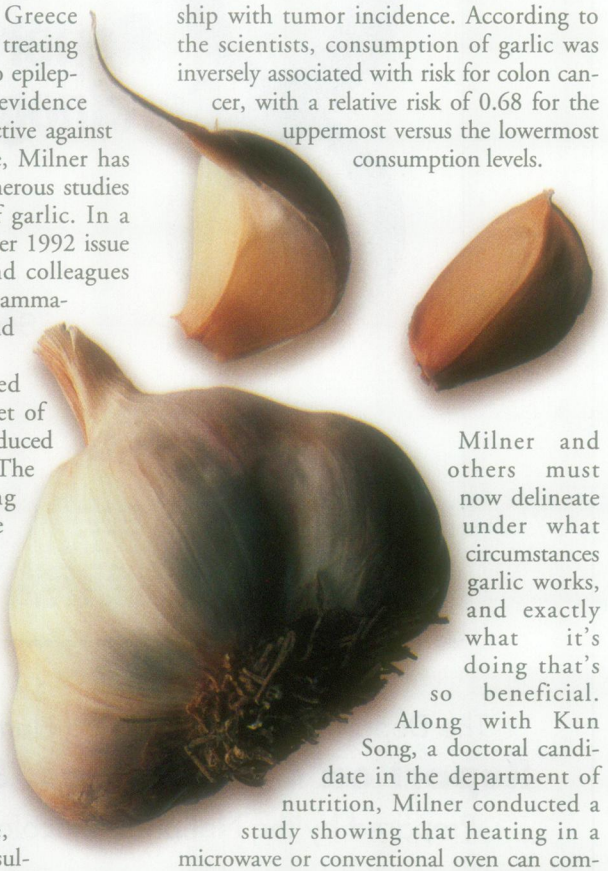
Garlic stimulates the body's immune system, boosting the killing ability of natural killer cells and increasing macrophage activity. Garlic also works against heart disease and strokes by lowering cholesterol levels and blood pressure. As an anticancer agent, Milner and others' work shows that garlic slows tumor growth and protects against potential damage from oxidation, free radicals, and nuclear radiation.

Garlic has long been a folk-remedy favorite—ancient manuscripts from Sumer, Egypt, China, and Greece describe the use of garlic for treating everything from snake bites to epilepsy. There is now scientific evidence that the bulbous herb is effective against cancer. Over the last decade, Milner has published and presented numerous studies on the anticancer effects of garlic. In a study published in the October 1992 issue of *Carcinogenesis*, Milner and colleagues tested the effect of garlic on mammary tumors in rats. They found that dietary garlic administered in powder form caused significant delays in the onset of first mammary tumors and reduced the final number of tumors. The team found that consuming garlic powder depressed the binding of the potent carcinogen 7,12-dimethylbenz(a)anthracene to mammary cell DNA in the rats, which may explain why fewer tumors developed.

In a study published in the 15 October 1993 issue of *Cancer Letters*, Milner and Sujatha Sundaram, a doctoral candidate at Penn State, tested the effect of six organosulfur compounds found in garlic on the growth of canine mammary tumor cells in culture. Three of the compounds—diallyl sulfide, diallyl disulfide, and diallyl trisulfide—sharply curbed the proliferation of tumor cells.

In the 19 April 1996 issue of *Cancer Letters*, Milner and research assistant Eric Schaffer compared the effect of garlic powder, the water-soluble compound S-allyl cysteine, and diallyl disulfide on the incidence of mammary tumors induced by *N*-methyl-*N*-nitrosourea. All three compounds were found to delay the onset of mammary tumors in female rats, and to reduce the overall incidence of tumors. Garlic powder led the race, with an 81% reduction in tumor incidence.

Finally, in a study published in the January 1994 issue of the *American Journal of Epidemiology*, a team of scientists from the University of Minnesota in Minneapolis and the University of Washington in Seattle looked at the effects of 15 different fruits and vegetables on tumors among a group of women from the Iowa Women's Health Study. Of all the fruits and vegetables studied, garlic was found to have the most dramatic relationship with tumor incidence. According to the scientists, consumption of garlic was inversely associated with risk for colon cancer, with a relative risk of 0.68 for the uppermost versus the lowermost consumption levels.



Milner and others must now delineate under what circumstances garlic works, and exactly what it's doing that's so beneficial. Along with Kun Song, a doctoral candidate in the department of nutrition, Milner conducted a study showing that heating in a microwave or conventional oven can completely strip garlic of its cancer-fighting benefits. However, if the garlic is minced or crushed and allowed to stand for at least 10 minutes before heating, there is little or no loss of benefits. The 10-minute standing period allows the enzyme alliinase in the garlic to begin producing allyl sulfur compounds—the compounds with the cancer-fighting properties. If the garlic is cooked immediately after chopping, the heating process deactivates the enzyme and the anticarcinogenic effects of the garlic are lost. Milner presented these findings at a symposium entitled Recent Advances on the Nutritional Benefits Accompanying the Use of Garlic as a Supplement, held in Newport Beach, California, 15–17 November 1998.

So far, the only known adverse health effects from eating too much garlic are gastrointestinal bleeding and stomach upset, plus of course the much-maligned garlic breath. But garlic's rising popularity—thanks to the increasing public and scientific interest in herbal medicine—means that consumers have a choice of ways to take their medicine, including some odorless varieties. Milner says that many of the commercially available garlic preparations that he and colleagues have tested, including deodorized varieties, have anticancer properties. There is little reason to avoid garlic and many reasons to enjoy it, says Milner—in whatever preparation desired.

Fertilizing or Contaminating?

Is fertilizer hazardous to your health? That question was raised by a sensational 1997 series in the *Seattle Times* that claimed to have unearthed a widespread and largely unregulated practice of recycling industrial waste into fertilizer. The material in question, which can contain radioactive matter, dioxins, or heavy metals, was being distributed to fertilizer companies or farms by manufacturers eager to avoid treatment and disposal costs by taking advantage of a loophole in the Resource Conservation and Recovery Act (RCRA), the major federal toxic chemical law.

The series was followed in March 1998 by a report titled *Factory Farming*, published by the Environmental Working Group (EWG), a nonprofit organization based in Washington, DC. Using data from the Toxics Release Inventory (TRI), the EWG said that 271 million pounds of toxic waste was received by 454 farms and fertilizer manufacturers in 38 states between 1990 and 1995. The waste contained 69 toxic chemicals, including nearly 6.3 million pounds of lead and lead compounds, 230,000 pounds of cadmium, and 16,000 pounds of mercury, along with 23.5 million pounds of industrial organic chemicals.